REMARKS

Applicant appreciates the Examiner's review of the present application. Claims 1-17 have been further rejected under 35 U.S.C. § 102(e) as being unpatentable over U.S. Patent No. 6,151,404 to Pieper (the Pieper patent). Applicant has not amended Claims 1-7, 9-13, and 15-17. Applicant has amended Claims 8 and 14 in order to advance prosecution of the claimed invention by clarifying the differences of the claimed invention from the prior art, including the Pieper patent, without further narrowing those claims. In response to the Office Action and as explained in more detail below, Applicant respectfully submits that the Pieper patent does not teach or suggest the claimed invention and further that the claimed invention is not obvious in view of this reference. Accordingly, the Applicant respectfully traverses the rejections of the claims under § 102(e) over Pieper. In light of the amendments and the remarks presented below, including the general distinctions beginning on page 10, the Applicant respectfully requests reconsideration and allowance of all the claims of the present invention.

The Pieper patent discloses a visualization system and method for viewing a three dimensional model of multiple two dimensional tomographic images, a method of marking a corresponding location in separate two dimensional images and/or in a three dimensional model, and a method of measuring anatomical features from two dimensional images and a three dimensional model. The Pieper patent is related only to post-acquisition visualization and analysis performed on a device other than the image acquisition device.

The Applicant respectfully submits that the Examiner has misinterpreted the Pieper patent with respect to the scope of the claimed invention. The Pieper patent relates to viewing and manipulating tomographic images *after* they are scanned by an imaging device and does not relate to a device for acquiring additional image data. An operator defined plane of the present invention drives the acquisition of additional scan data by the imaging device. As such, the Pieper patent does not teach or suggest, as recited in Claim 1 and representative of Claims 8 and 14, a 3-D model device in communication with an imaging device such that an operator may

define scan geometry to acquire new scan data by the imaging device. As referred to in the specification, the invention provides for "visualization and interactive pre-acquisition definitions of scans." *See, e.g.*, Appln., p. 11, ll. 10-11 and 16-17.

Also recited by Claim 1, representative of Claims 8 and 14, operator input defines an operator defined plane. The selection by an operator as described in the Pieper patent is a selection of a pre-existing 2-D slice image from the 2-D slice image data (see, e.g., col. 10, ll. 8-9), not a selection or definition of an operator defined plane or scan geometry. Advantageously, an operator of the present invention is not limited to pre-existing planes, and an operator may define scan geometry for any desired operator defined plane using the benefits of the visualization of a 3-D model. The citation in the Office Action of Pieper teaching a means for selecting a particular 2-D slice image at column 4, lines 8-10, (OA, p. 3) teaches that the second software object inserted into the 3-D model is at the position corresponding to the position of the selected 2-D slice image selected by the operator from the 2-D slice image database. This language does not teach or suggest that an operator defines, relative to the 3-D model, scan geometry for a new scan plane to be acquired by the imaging device. The selected slice image of Pieper is not the same as an operator defined plane as recited in the claims of the present invention. An operator of the Pieper patent is limited to the slice images that have already been acquired by the imaging device and is not able to define additional slice images that may subsequently be added to the 3-D model. The Pieper system and method are not interactive with the imaging device, but only interactive with the 3-D computer model based upon existing data in a 2-D slice image database. The Pieper system does not provide how additional scan planes may be defined for subsequent acquisition.

In order to further highlight these distinctions, Claims 8 and 14 have been amended in order to advance prosecution of the claimed invention by clarifying the differences from the Pieper patent without further narrowing those claims. Specifically, the preamble of Claim 8 recites a "method for enabling the interactive modification of operator defined scan geometry in an imaging system." To highlight the intent of the preamble and the teaching of the specification of the present invention, "defining scan geometry determined by the operator with respect to the

3-D model for the imaging device to acquire additional image data" has been added to Claim 8. Similarly, the preamble of Claim 14 recites "visually driven definition of tomographic image planes," and to highlight the intent of the preamble and the teaching of the specification of the present invention, "computer-readable code means for defining scan geometry determined by the operator with respect to the 3-D model for the imaging device to acquire additional image data" has been added to Claim 14. Support for each of these amendments can be found in the specification at, for instance, page 5, lines 10 and 16-20; page 6, line 2 through page 7, line 10; page 11, lines 9-12 and 15-18; page 12, lines 11-17; page 17, lines 20-26; page 19, lines 25-28; and page 23, lines 22-30.

Similarly, the citation in the Office Action that the Pieper patent teaches defining an orientation of the operator defined plane at column 10, lines 33-34, (OA, p. 4) teaches that the operator may select a particular viewing angle. The Applicant represents that changing the viewing angle of the object image does not define an image slice or an operator defined plane. Changing the viewing angle of the 3-D model is equivalent to changing the virtual camera position described in the present application. *See* Appln., p.5, ll. 1-3, p.15, l. 8, ll. 11-12.

As recited by Claim 2, representative of Claim 9, scan geometry parameters representative of operator input are generated by a scan geometry module and communicated by the scan geometry module to the imaging device such that the imaging device can acquire the operator defined plane. The Applicant asserts that the Pieper patent disclosing a 3-D geometry database is insufficient to teach or suggest the limitations of Claim 2. Further, the Applicant asserts that nothing in the Pieper patent teaches or suggests generating scan geometry parameters to acquire an operator defined plane by the imaging device.

As recited by Claim 3, representative of Claims 10 and 15, the 3-D model device updates the 3-D model to include the acquired operator defined plane. As described above, Pieper only teaches an operator selecting a slice image from a database of existing 2-D slice images and does not teach or suggest that an operator define a plane. Although the Pieper patent teaches that a 3-D model may be updated with a selection of a different 2-D slice image, the Pieper patent does not teach updating the 3-D model with an operator defined plane. Similarly, as recited by Claim

4, representative of Claims 11 and 17, the operator is able to define a new operator defined plane after the 3-D model has been updated to include the previously acquired operator defined plane. Because the Pieper patent does not teach that an operator defines a scan plane, the Pieper patent cannot teach or suggest defining a new operator defined plane after the 3-D model is updated with a previously acquired operator defined plane.

As recited by Claim 5, a 3-D model device includes a scan model, for receiving the scan geometry parameters. The citation in the Office Action that the Pieper patent teaches a scan model at column 3, line 52, (OA, p. 5) teaches, not that the first software object is a 3-D geometry database as expressed in the Office Action, but that the "3-D computer model comprises a first software object that is defined by a 3-D geometry database." Furthermore, the Office Action confuses a first software object representing a 3-D model and a scan model for receiving scan geometry parameters. Pieper does not teach or suggest scan geometry parameters and, hence, does not teach or suggest a scan model, but a 3-D model.

As recited by Claim 7, representative of Claim 13, an operator may alter the orientation of the operator defined plane in the 3-D model. The Pieper patent does not teach or suggest an operator defined plane, but a plane corresponding to a selected, existing 2-D slice image. The Pieper patent only provides that an operator may select a particular viewing angle of the 3-D model that comprises a compilation of such 2-D slice images. *See* col. 10, ll. 1-10, *cited in* Office Action, p. 5; *see also* col. 10, ll. 33-34, *cited in* Office Action, p. 4. Changing the viewing angle of the 3-D model does not describe the selection of a completely unique plane which is subsequently scanned by an imaging device of the claimed invention. Instead, a selection of a viewing angle of the Pieper patent is only equivalent to changing the virtual camera position described in the present application, represented by Claim 12, not altering the orientation of an operator defined plane.

The rejections of Claims 1-17 under 35 U.S.C. § 102(e) is therefore overcome based upon the Applicant's remarks with respect to the Pieper patent.

Furthermore, the Applicant respectfully submits that the invention is not simply the use of a 3-D model device for generating a 3-D model based upon plane images. The Applicant does not submit that the invention is the generation of a 3-D model based upon one or more plane images acquire from the image device. Rather, the invention and claims thereto compound the use of a 3-D model based upon plane images such as localizer images to allow an operator to define a non-existing scan plane to be acquired by the imaging device such as an MRI scanner. The operator defined plane provides the scan geometry for the imaging device. Each claim includes a limitation that the system is used to allow an operator to define scan geometry for an operator defined plane to be acquired by the imaging device, not just to display existing scan images in three dimensions. The visualization of intersections of plane graphics, defining existing and new image planes, along with the operator's ability to manipulate the location and orientation of these new image planes in the 3-D view, allow the operator to conveniently align a new image plane with one or more important landmarks pertinent to imaging of certain desired anatomy. And although the technology of the invention could also be used to "re-slice" existing voxel data sets to acquire new planes, the invention and claims thereto relate to the acquisition of new scan data by the imaging device. The Applicant asserts that using a 3-D modeling device to selectively define scan plane images to be acquired during image acquisition is neither taught or implied by the Pieper patent and would not have been well known to one of ordinary skill in the art when the application was filed on May 22, 2000.

In view of the remarks presented above and amendments to the claims, it is respectfully submitted that the present claims are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicant's undersigned attorney to resolve any remaining issues in order to expedite examination of the present invention.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required

therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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